

Elwood Bridge
St. Louis County Road 696 Over DM&IR Railyard
Proctor, ~~Minnesota~~ vicinity
St. Louis County
Minnesota

HAER No. MN-84

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Rocky Mountain Regional Office
National Park Service
P.O. Box 25287
Denver, Colorado 80225-0287

HISTORIC AMERICAN ENGINEERING RECORD

ELWOOD BRIDGE

Location: Carrying St. Louis County Road 696 and spanning the Duluth, Missabe & Iron Range Railroad yard near Proctor, Minnesota.

Historic Name: Elwood Bridge

USGS Quadrangle: Sec. 33, Twp. 50N, Range 15W

Construction Dates: Original construction - 1916; Modified 1940 (date uncertain), 1955, 1978

Fabricator: American Bridge Company

Drawings: H.W. Fornell (packing and foundation plan)
Hughes (erection plan)

Present Owner: Duluth, Missabe & Iron Range Railroad

Present Use: Vehicular use. Demolition and replacement scheduled for 1996.

Minnesota Department
of Transportation
Number (Mn DOT): 7803

St. Louis County
Bridge Number: B-5-33-3

Significance: The Elwood Bridge is a single span steel Parker through truss. The bridge was built in 1916 by the American Bridge Company for the Duluth Missabe & Northern. It was built to create a railroad crossing grade separation at the intersection of the St. Louis River Road and the Duluth Missabe and Northern Railroad (currently known as the Duluth Missabe and Iron Range Railroad).

Historian: Debra J. Kelly
May, 1995

The Elwood Bridge carries St. Louis County Road 696 and spans the Duluth Missabe and Iron Range Railroad yard northwest of Proctor, Minnesota. The bridge was built for the Duluth Missabe and Northern Railroad (DM&N) in 1916. The Elwood Bridge was so-named in reference to a DM&N station facility.¹

The Elwood Bridge plan was drawn by H.W. Fornell of the American Bridge Co. The American Bridge Company was a merger of 23 bridge manufacturing companies from around the country and was one of the largest bridge building companies in the United States, comprising 50% of the nations fabricating capacity.² It was incorporated in 1900 by J.P. Morgan & Co. and became a subsidiary of the United States Steel Co. (U.S. Steel) in 1901. U.S. Steel also purchased the Duluth Missabe and Northern Railroad (DM&N) and the Duluth & Iron Range Railroad (D&IR) in 1901. The two railways merged to become the Duluth Missabe and Iron Range Railroad (DM&IR) in 1938.³

¹ Duluth Missabe & Iron Range (DM&IR) Railway files: Blueprints drawn in 1916 for the Elwood Bridge indicate the Town of Elwood; DM&IR Engineer, Mr. William Harrison, indicates the bridge may have been named after a section facility. A weigh station is located on the DM&IR tracks directly north of the bridge.; St. Louis County Highway Department - map collection: 1932, 1936, maps do not make reference to Elwood, Minnesota.; St. Louis County Bridge file: Elwood (referenced south of the bridge at the railroad tracks) and Elwood Bridge are referenced on a hand-drawn map and are included as an attachment to the Grade Separation Sheet prepared 6/12/62 for the Minnesota Highway Department.

² Multiple Property Documentation Form, Dale Martin, p. E10; Final Report of the Minnesota Historic Bridge Survey, Jeffrey A. Hess, p. 28. The above-referenced documents assert the American Bridge Company was comprised of 23 and 24 companies, respectively.

³ Missabe Road, Frank King, p. 77; Multiple Property Documentation Form, p. E15. The differentiation between the DM&N and the DM&IR is important when referencing past events. In this report, DM&N will correspond to events prior to 1938 and DM&IR will correspond to

By all accounts it appears the DM&IR owns the Elwood Bridge, yet, no documentation other than blueprints drawn for the DM&N substantiate ownership.⁴ Verbal accounts indicate an agreement detailing conditions of ownership was formulated between the DM&N and St. Louis County. The agreement allowed the DM&N to build and maintain the bridge and provided St. Louis County with the authority to oversee maintenance plans.⁵ The perception of a joint propriety shifted to a generally accepted notion that bridges carrying county roads were owned by the county outright.⁶ This perception is likely due to the establishment of the Minnesota Highway Commission (MHC). In Minnesota, during the years 1905-1920, bridge construction was frequently governed by individual counties in conjunction with the MHC. The mission of the MHC was to provide funding to counties who utilized designs developed by the MHC. St.

events post 1938.

⁴ DM&IR Blueprints, 1916, contract no. D-6630. The DM&IR does not have records, other than blueprints, dating back to 1916.

⁵ Interviews with Mr. William Harrison, DM&IR, Engineer; Mr. Marcus Hall, St. Louis County, Engineer, Mr. Ron Gordon, St. Louis County, 5th District.

⁶ It becomes apparent, through correspondences between St. Louis County and DM&IR officials, the bridge is owned and maintained by the DM&IR, yet St. Louis County oversees all maintenance operations conducted by the DM&IR. Highway Department Manual No. 5-791, Maintenance Manual, Engineering State of Minnesota, Department of Highways, item 5-791.252 Policy and Responsibility: "Maintenance of each structure is the responsibility of the District in which the structure is located". "Bridges for Railroad Overpasses and Underpasses: At grade separations involving railroads over or under the highway, the maintenance repair responsibility varies depending upon the language in the agreement. There may be bridges where no agreement exists at the present time. These were often built and maintained by the Railroad in the past."; A memo dated January 20, 1970 regarding Bridge No. B-5-33-3, located in Section 33, Township 50N, Range 15 West, Highway Bridge over DM&N Railway indicates "A search to the Auditors Office"...(presumably of St. Louis County) "did not reveal any agreement between the DM&N Railway and the County or any township in respect to the construction of the bridge on the St. Louis River Road".

Louis County Commissioners were responsible for selecting the lowest bid based on the standardized plans. Many of the bridges built in the years 1915-1916 utilized design plans furnished by the MHC.⁷ However, in some instances, railroad companies designed and constructed bridges which carried county roads. Railroads typically built these bridges to create grade separations which would provide uninterrupted traffic along railroad lines and county roads.

A complete inventory of construction records are not available for the Elwood Bridge. Information regarding the specifications were taken from blueprints on file at the DM&IR and St. Louis County offices. Details of the original design specify a single-span, steel, Parker through truss with approach spans having an overall width of 20 feet, overall length of 1221'-3 5/8", truss length of 169'-11 5/8" (9 sections @ 18'-10 5/8" = 169'-11 5/8"), structural steel section (includes two 20' towers) length of 209' - 11 5/8", east approach length of 474'-0", west approach length of 537'-4". Specifications include the use of O.H. medium steel and required a coat of graphite paint to be applied in the shop and a second coat applied after erection. These specifications are described as the American Bridge Company's Standard for Highway Bridges.⁸

⁷ Hess, page 22-27.

⁸ DM&IR files, Proctor, Minnesota. Blueprint, Highway Bridge for D.M. & N. Ry, North of Elwood, Minn., Submitted by: American Bridge Co., May 23, 1916 in reference to contract D-6630; St. Louis County Bridge File, blueprints: Packing and Foundation Plan, North of Elwood, Minn. for Duluth Missabe and Northern Ry. Co. Duluth, Minnesota, American Bridge Co., June 29, 1916, and Erection Plan, D.M. & N. Ry, North of Elwood, Minn., American Bridge Co., Aug. 24, 1916.

A narrative description is transcribed from the Statewide Bridge Survey Form:

Bridge 7803 is a steel, single-span, nine-panel, pin-connected Parker through truss, with one modern I-beam stringer approach span at each end. Parker superstructure: The upper chord consists of paired channels with continuous cover plates riveted on top and lattice underneath. The main verticals are laced paired channels; the hip verticals are two sets of paired angle sections joined by batten plates. Most diagonals, as well as the lower chord, are paired punched eye-bars. Counters are turnbuckles, as are both diagonals in the middle panel. The floor is wood planks on wood beam stringers, which sit on the upper flanges of the I-beam floor beams, which in turn are riveted to the verticals above the pin connections. Portal bracing is a lattice of angle sections between paired angles, with knee braces. Sway bracing consists of lacing between paired angle sections with knee braces. Top lateral bracing is lacing on angle sections; bottom lateral bracing is round rods. The main span rests on truss piers set on concrete pads. In these piers the verticals are laced paired channels and diagonal and horizontal elements are paired angle sections with lacing in between. The movable (west) end of the span has rollers. The two approach spans, with large I-beam stringers, replaced wood pile trestle approaches.⁹

Modifications of the Elwood Bridge appear to have occurred around 1940 and are known to have

⁹ Statewide Bridge Survey Inventory Form for Bridge # 7803, Surveyed by Dale Martin.

occurred in 1955 and 1978. Variations noted on the respective blueprints suggest the approaches were reconstructed at some point between 1916 and 1955. It appears the original approaches were removed, the land was bermed and new approach spans were built. Handwritten notes of DM&IR employee Jack Zeleznikar suggest this occurred in 1940.¹⁰ In July 1954, the DM&IR prepared a plan for re-building the bridge. Modifications included removal of the deck (3'x12" planks and 4"x12" stringers) and replacement with 4"x12" planks on 6"x14" stringers on the truss and tower spans. The plan specified re-use of the 3"x12" deck planks and the 4"x12" stringers for girt and cross bracing. The plan also included elimination of the 32 foot abutment at the west end and elimination of the 16 foot span on the east approach. The plan was revised in November to add a 16 foot span on the east end.¹¹ Modifications were completed December 8, 1955. In 1978, plans to re-design the east and west approach were drafted. The existing grade was increased overall on both approaches. Construction started approximately August 1, 1978 and was anticipated to be completed in 4-5 weeks.¹² After the DM&IR completed reconstruction of the approach spans, the load limit was recalculated and increased to 14 tons per

¹⁰ St. Louis County Bridge File: Handwritten notes, Jack Zeleznikar, DM&IR, provide a sketchy chronology of bridge reconstruction: "BR & APP. CONST'D 1916; CONST. AGG APP - 1940; REPLACED DK 1956; PSTD. 7T 1968". A comparison of the 1916 and 1955 blueprints indicate the east approach span to be 474'-0" in 1916 and 63' in 1955. The west approach span was 537'-4" in 1916 and 79' in 1955.

¹¹ DM&IR office files, Proctor, Minnesota. Blueprints: DM&IR Ry plan for Re-Building Hwy Bridge at Elwood, General Layout. Office of the Chief Engineer, Duluth, MN, July 1954.

¹² St. Louis County Bridge File, Blueprints, Elwood Bridge Approach Re-Design. 6/30/78. A memo dated 10-23-74 regarding Bridge 241 (B-5-33-3) states the "approach grades are bad (too steep)". This memo is handwritten to John Powers and is unsigned. Handwritten notes, 7/7/78, J. Zeleznikar, DM&IR, indicate the proposed increase of the west approach will be .5 feet and the proposed increase of the east approach will be 2.3 feet.

vehicle. At that time, St. Louis County Engineer, C.A. Sivertson, recommended replacing the 7 ton load limit signs with "Bridge Weight Limit 14 Tons" signs at each approach. C.A. Sivertson also recommended enforcing a lower speed limit and prohibiting simultaneous passage of trucks on the bridge due to the narrow width of bridge, short sight lines and approach grades.¹³

The Elwood Bridge appears to be the original bridge spanning the DM&N/DM&IR. It was created to establish a grade separation crossing at St. Louis River Road (also referred to as County Road 696 - and formerly named County Road 57). The St. Louis River Road was established in 1870 and was used primarily to carry vehicles to and from the Proctor area and the western portion of the county and state. This roadway likely served as a conduit between the municipalities located near the railroad yards in Proctor and its terminus in Duluth, and the farming communities located in the western outlying areas.¹⁴ Building the bridge in this location was necessitated by the growth the DM&N was experiencing. In 1916, the same year the Elwood Bridge was built, the DM&N experienced a record year in terms of tonnage moved.¹⁵ The DM&N found it essential to create a grade separation to facilitate the expanding railroad activity, and to provide a safe and convenient crossing for vehicular traffic along St. Louis River Road.

¹³ St. Louis County Bridge File, Memo, 8/29/79, to Joe Varda, Maintenance Engineer for St. Louis County, signed by C.A. Sivertson, Bridge Engineer, St. Louis County.

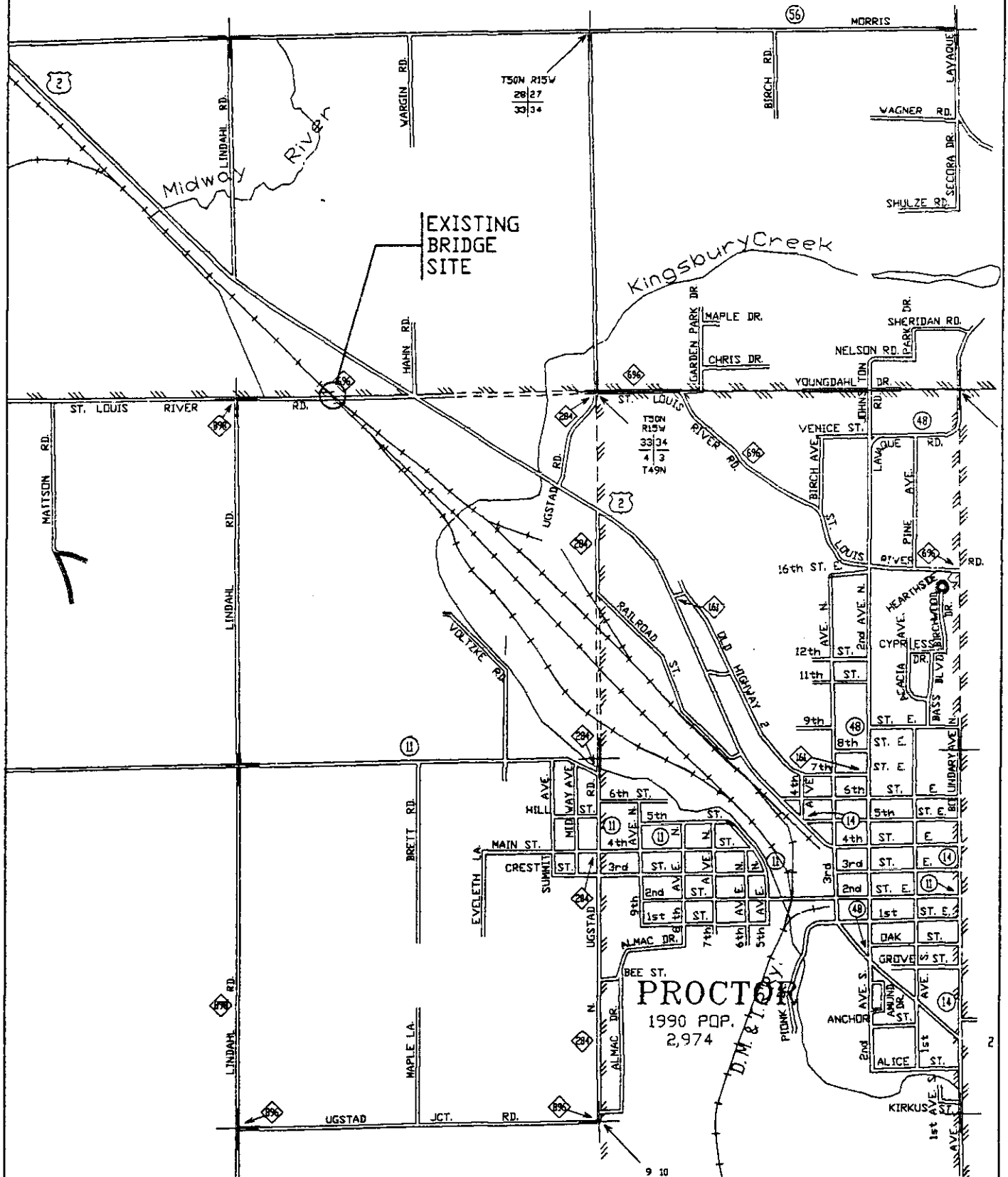
¹⁴ St. Louis County, Their Story and People, p. 179.

¹⁵ The Missabe Road, p. 101.

Railroad companies built numerous bridges in Minnesota and influenced the evolution of bridge construction in the state. Prior to the development of railroads, most bridges crossed natural barriers, few crossed human made features (e.g., railroad tracks). Examples of these bridges are most commonly found in larger cities or in smaller communities with large rail yards. The Elwood Bridge is a primary example of where a grade separation was created in a small community to facilitate efficient vehicular and rail transportation.¹⁶ Of additional significance, the Elwood Bridge was part of the Minnesota Statewide Survey conducted in 1987, and was included in the Historic Bridge Project Study Group component of that survey. Eligibility of the Elwood Bridge for nomination to the National Register of Historic Places was considered to be indeterminate at that time. Potential eligibility was considered relative to its association with the DM&IR.¹⁷

¹⁶ Multiple Property Documentation Form, p. E3.

¹⁷ Hess, p. 105, 115. Correspondence from the State Office of Historic Preservation of the Minnesota Historical Society (MHS), St. Paul, Minnesota to St. Louis County Public Works Department, Duluth, Minnesota. MHS would like to see the bridge retained and rehabilitated. St. Louis County has undergone specified mitigation measures which included offering the bridge for sale or for take.



In the middle of the 19th century the nation's railroad industry was booming. The development of this industry expanded demands for advances in engineering technology. The rapid growth of the railroad industry influenced the development of new bridge types, new construction techniques and a shift to new building materials.¹⁸ As a structural form, the truss bridge was first built from wood/timber. Due to the expansion of the railroad network in the United States metal truss bridges transcended the less durable timber structure largely due to the modernization of bridge engineering developed for the nations railroads. The overwhelming majority of metal bridges built during the nineteenth and early twentieth century were truss types. Because of the ease of its erection and its stability in a wide variety of site conditions, the truss bridge was a favorite choice for many railroad companies and highway bridge designers.¹⁹

Differentiation among truss types often reflect the name of the builder, designer, or engineer who first patented that style and are distinguished according to the configuration of the component triangles and the manner in which individual members are stressed.²⁰ The Pratt Truss, developed by Thomas and Caleb Pratt in 1844, is a common metal truss type and serves as the archetype for the Parker Truss, developed by C.H. Parker. The Parker Truss is characteristic for its inclined top chord.²¹ The Elwood Bridge is an example of this common structural type.

¹⁸ Historic Highway Bridges in Pennsylvania, Commonwealth of Pennsylvania Historical and Museum Commission, Pennsylvania Department of Transportation, 1986, p. 4.

¹⁹ Ibid., p. 10-11, 109.

²⁰ Ibid., p. 112.

²¹ Ibid., p. 112-113, 116.

The Elwood Bridge continues to serve the community in the same way as historically intended, and remains in fair condition. Due to the significant modifications of the approach spans in the 1940s, the architectural integrity of the bridge has been adversely impacted. For the purposes of the planned demolition and subsequent reconstruction of a bridge at this location, and to establish a documented record of ownership, St. Louis County intends to purchase the Elwood Bridge from the DM&IR. St. Louis County intends to demolish the bridge and replace it in 1996 with a pre-stressed concrete beam bridge. St. Louis County has agreed to provide documentation of the bridge in accordance with guidelines established by the Historic American Engineering Record of the National Park Service. This report intends to fulfill those requirements.

PUBLISHED SOURCES

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Commonwealth of Pennsylvania and Museum Commission
Pennsylvania Department of Transportation
1986

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Golden West Books, San Marino, CA
1972 copyright by DM&IR Ry

Steel Rails & Iron Men
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Walter Van Brundt
American Historical Society
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UNPUBLISHED SOURCES

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Highway Department Manual No. 5-791
Maintenance Manual, Engineering
State of Minnesota Department of Highways

St. Louis County Bridge File
B-5-33-3, C.R. 696, ACC'T No. 241

Minnesota Historical Society, State Historic Preservation Office
Bridge File, Mn DOT No. 7803

Book of County Roads
St. Louis County Office of Public Works, Duluth, Minnesota

St. Louis County Office of Public Works,
Miscellaneous Files: DM&IR, St. Louis River Road,
Road & Bridge, County Maintenance Record, City of Proctor

Mr. Harrison, Engineer
DM&IR Railroad
Proctor, Minnesota

Mr. Schendel
Transportation Museum
Duluth, MN

Ms. Michelle DeRossier
St. Louis County Law Library

MAPS

1932 Map, Compiled from Official Survey and Drawn by: St. Louis County Highway Department, Duluth, Minnesota (located in the Office of Public Works, St. Louis County, Minnesota)

Map 1936, State of Minnesota Department of Highways, St. Louis County, copyright 1936

USGS Quadrangle
Adolph, MN
46092-G3-TF-024
1953, Revised 1993